

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended) A method of etching silicon anisotropically, comprising:

etching in which a silicon substrate (2), protected in part by a mask, (2e) is subjected to an alternating succession of attack steps (a) using a plasma of etching gas to make cavities (2b) in zones of the substrate that are not protected by the mask (2e), and

depositing a protective polymer passivation steps (b) using a plasma of passivation gas for depositing protective polymer (2f) on the walls of the cavities (2b) that result from the attack steps using a plasma of passivation gas, and

subjecting the method being characterized in that it further comprises selective depassivation pulse steps (c) in which the protective polymer deposit to (2f) is subjected to the action of a plasma of cleaning gas that removes the protective polymer (2f) from the bottom zones (2g) of the cavities (2b) and that, wherein the plasma of cleaning gas is more effective than the etching gas at removal of the protective polymer.

2. (currently amended) A-The method according to claim 1, ~~characterized in that it includes a selective depassivation pulse step (c) after each passivation step (b).~~ wherein the plasma of cleaning gas is applied after each deposit of the protective polymer.

3. (currently amended) A-The method according to claim 2, ~~characterized in that each selective depassivation pulse step (c) wherein the application of the plasma of cleaning gas does not overlap the preceding passivation step (b).~~ deposit of the protective polymer and does not overlap the a following attack step (d). etching of the silicon substrate.

4. (currently amended) A-The method according to claim 1, ~~characterized in that~~ wherein the etching gas is a fluorine gas such as SF₆, CF₄, or NF₃.

5. (currently amended) A-The method according to claim 1, ~~characterized in that~~ wherein the passivation gas is a fluorocarbon gas such as CHF₃, C₂F₆, C₂F₄, or C₄F₈.

6. (currently amended) A-The method according to claim 1, ~~characterized in that~~ wherein the cleaning gas contains oxygen.

7. (currently amended) A-The method according to claim 6, ~~characterized in that~~wherein the cleaning gas comprises at least one of the following gases: O₂, SO₂, CO, CO₂, NO, NO₂, and N₂O.

8. (currently amended) A-The method according to claim 1, ~~characterized in that~~wherein during the ~~selective depassivation pulse step (c)~~application of the plasma of cleaning gas, the silicon substrate-(2) is biased so as to ~~attack~~attract the ions of the plasma of cleaning gas.

9. (currently amended) A-The method according to claim 8, ~~characterized in that~~wherein the silicon substrate-(2) is biased by a voltage close to ~~the~~a voltage used during the ~~attack step (a)~~etching of the silicon substrate, typically in ~~the~~a range 20 V to 100 V, advantageously and preferably in the a range 20 V to 80 V.

10. (currently amended) A-The method according to claim 8, ~~characterized in that~~wherein the bias voltage applied to the silicon substrate-(2) is increased progressively from one ~~depassivation step~~application of the plasma of cleaning gas to another application of the plasma of cleaning gas, during the process of etching ~~a~~the silicon substrate-(2).

11. (currently amended) A-~~The~~ method according to claim 8, ~~characterized in that wherein~~ during the selective depassivation pulse step (e), application of the plasma of cleaning gas, the a pressure of the atmosphere (5) surrounding the silicon substrate (2) lies in the a range 0.5 Pa to 10 Pa, and preferably in the a range 2 Pa to 5 Pa.

12. (currently amended) A-~~The~~ method according to claim 1, ~~characterized in that wherein the a duration of the selected depassivation steps (e)~~ application of the plasma of cleaning gas is selected to be just sufficient to ensure effective cleaning of the bottom zones (2g) of the cavities (2b).

13. (currently amended) A-~~The~~ method according to claim 1, ~~characterized in that wherein the a duration of the selected depassivation pulse step (e)~~ application of the plasma of cleaning gas is determined as a function of the a duration of the preceding passivation steps (b) deposit of the protective polymer.

14. (currently amended) A-~~The~~ method according to claim 1, ~~characterized in that wherein the a duration of the selected depassivation pulse step (e)~~ application of the plasma of cleaning gas increases from one depassivation step application to another during the process of etching a the silicon substrate (2).

15. (currently amended) ~~Apparatus~~ An apparatus for anisotropically etching silicon substrates ~~(2)~~, ~~by implementing a method according to claim 1~~, the apparatus comprising:

a gastight enclosure ~~(1)~~ shaped to receive and contain a substrate ~~(2)~~ for etching;

means ~~(6, 7)~~ for creating and maintaining a suitable vacuum in the enclosure ~~(1)~~;

gas injection means ~~(13)~~ for selectively injecting into the enclosure ~~(1)~~ an etching gas, a passivation gas, and a cleaning gas for programmed durations and at programmed flow rates;

means ~~(8)~~ for generating a plasma ~~(9)~~ in the enclosure ~~(1)~~ facing ~~the~~ a surface ~~(2a)~~ of the substrate ~~(2)~~ that is to be etched;

means ~~(4)~~ for biasing the substrate ~~(2)~~; and

control means ~~(22)~~ for controlling the gas injection means ~~(13)~~ to perform the successive application of etching gas, passivation gas, and ~~depassivation~~ cleaning steps gas.

16. (currently amended) A silicon-based component having a micro-relief ~~(2b)~~ ~~presenting with~~ an aspect ratio greater than 30, the silicon-based component made using a method according to claim 1.